

having been formerly part of them. We know also from the observations of Mr. Darwin, that many large tracts in the Southern hemisphere are undergoing undulations of surface similar to those required by my hypothesis, so that on the whole I think I have left no point exposed, in which the assumption of a cause that is insufficient or improbable under the circumstances will invalidate my argument. After all it must be understood that I only offer an hypothesis that appears to me probable to explain a phenomenon of great and acknowledged difficulty, and no one can be more thoroughly aware than myself that there must always be a wide and strongly marked distinction between such hypothetical explanations and the numerous well-founded deductions with which geology abounds, and which are unchangeable and unanswerable, because founded solely on the consideration of undoubted facts. I need not however add any remarks to illustrate the benefit resulting from the fair and unprejudiced discussion of the class of explanations which I now offer.

Jesus College, Cambridge, March, 1844.

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XXXI.—On some species of *Cuscuta*. By CHARLES C. BABINGTON, M.A., F.L.S., F.G.S. &c.\*

[With a Plate.]

It is now some years since my attention was first drawn to the structure of the corona, the prominent parts of which form what are usually denominated scales, in the interior of the tube of the corolla of the genus *Cuscuta*; but of which the existence in some species, *C. europæa* for example, is denied by several eminent botanists; and having soon become convinced of its presence in that plant, and also that the general shape and direction of its processes would furnish valuable characters for the discrimination of species in this genus, in which so few tangible points are afforded for that purpose, I presented to the Linnæan Society of London the results of an examination of those species which were within my reach in the form of two short papers which it did me the honour to publish in its Transactions, vol. xviii. p. 213 and 563.

Having since that time become more practised in the examination of such minute and inconspicuous objects, I have ascertained that the figures then published do not represent the characters of those curious organs with sufficient accuracy, and have therefore carefully prepared other drawings of the interior of the flowers of the species gathered in Britain, with the exception of *C. Epilinum*, which is well represented by Mr. Sowerby in the 'Suppl. to Eng. Bot.' (vol. iii. tab. 2850), and in which the cha-

\* Read before the Botanical Society of Edinburgh, Feb. 8, 1844.

acters derived from other more apparent parts of the flower are so satisfactory as to render it unnecessary to lay much stress upon these obscure organs. It will be seen that a careful attention to the general form of the scales and their connecting membrane, neglecting the minute and variable subdivisions, furnishes us with valuable distinctions for the separation of plants whose outward appearance is extremely similar, but which are constantly found to be parasitical upon plants of different structure or which inhabit distant countries.

Since attention has been drawn to these organs, many botanists have endeavoured to form some theory by which to account for their peculiar position in the flower. Their being placed opposite to the stamens and alternating with the segments of the corolla has presented so much difficulty, that no botanist, as far as I am informed, has ventured to express a positive opinion concerning them, although many have supposed that they represent an inner whorl of stamens in an altered condition. If that is the case, we ought to find the scales alternating with the stamens and not opposite to them. It thus became necessary to suppose either that an intermediate whorl was totally lost, giving three whorls of stamens to the normal state of the flower; or, that the scales represented some other organs, concerning which no conjecture has been published.

It will be seen from the sketches which accompany this paper that I have had the good fortune to meet with an undescribed Indian species, *C. approximata* (Bab. MSS.), in which the scales differ so much from their usual appearance as to lead me to form a theory concerning their origin, which, if allowed to be probable, will tend greatly to confirm the views of those botanists who suppose them to represent a whorl of stamens. In all the species, which have been carefully figured, the scales are represented as being separated from each other by a considerable space, and each of them is placed exactly under the insertion of the neighbouring stamen; and although in some cases (*C. europæa* for example) they are rather deeply bifid, still this bifurcation takes place in such a manner as not in the least to lead to the idea that the two parts are not portions of one and the same organ. In *C. approximata* (Pl. IV. fig. 3) each scale (continuing the usual nomenclature for convenience) is more deeply divided than in any species that has fallen under my notice, or of which I have seen a figure, and the lobes diverge from each other in a very remarkable manner, meeting below at a considerable angle. Again, the space between each scale, which in most, if not all the other species, is broad, deep and rounded, in *C. approximata* is very narrow, and terminates below in an extremely acute angle. Thus the appearance of the corona would inevitably lead a person previously unac-

quainted with the usual structure of the flowers of *Cuscuta* to the opinion, that five broad, blunt, deeply bifid processes were placed alternately with the stamens and opposite to the segments of the corolla; or in other words, that a whorl of organs existed exactly in the position which would be occupied by an internal whorl of stamens; and, if given to theorizing, he would at once decide that these organs were abortive and transformed stamens, and that in its normal condition *Cuscuta* was provided with two whorls of stamens, of which the outer one alone attained its perfect development.

It ought however to be stated, that even in *C. approximata* the line of separation between the corona and the corolla rises higher up the latter just under each stamen, as is the case in the other species. In each of my sketches I have endeavoured to represent the place of this separation by a line intervening between the upper edge of the corona and the base of the corolla; but it is necessary to add, that the exact point at which the free corona begins is often determinable with considerable difficulty, owing to its extreme thinness and transparency. It is possible therefore that the course of this line may not be found to be precisely as I have represented it; indeed in *C. europæa* it is little more than conjectural.

From this it will be justly deduced, that I have come to the conclusion that the scales are indeed abortive stamens; and I would endeavour to explain their peculiar position by supposing that each scale (as seen in *C. Epithymum* for example, fig. 1) is formed of two totally distinct parts, which, from some unknown cause, have become closely connected together by their edges, so as apparently to form but one organ situated beneath the stamen, whilst in reality the abortive stamen is represented by a deeply bifid membrane, each lobe of which is more or less closely soldered to the neighbouring lobe of the next abortive stamen; thus forming a whorl of scales, placed opposite to the perfect stamens, which appear to be simple, but are in reality composed of two parts. That this theory is not so wild as it might at first appear to be, is shown by the existence of a similar structure in the stigmatic rays of the *Papaveraceæ*, as has been proved by Mr. Robert Brown, and also, from independent observations, by Mr. Warren Howell. Let it however be remembered that I only put this theoretical explanation forward for the consideration of botanists, being well aware that much more extended observation is requisite before it can be considered as an established fact.

I now proceed to characterize the species to which the drawings refer, and as they all have filiform leafless stems and germinate in the ground, but afterwards become wholly parasitical, I

have not considered it necessary to describe any parts except the flowers.

1. *C. Epithymum* (Murr.); florum glomerulis bracteatis sessilibus, tubo corollæ cylindrico, squamis convergentibus fimbriatis subacutis spathulatis basi distantibus, calyce tubo corollæ multo breviori, germine spherico, stigmatibus filiformibus. (Pl. IV. fig. 1.)

*C. Epithymum*, Linn. *Syst. Nat. ed. Murray*, p. 140.

Flowers small. Calyx reddish; sepals rhomboidal-ovate, apiculate. Corolla white, with spreading acute segments. Anthers roundish-oblong, blunt or slightly notched at the end. Scales nearly as long as the tube of the corolla, widening from below up to the commencement of the fringed part, then narrowing in a triangular manner so as to be rather acute at the end, separated by rounded spaces, but at the same time connected (as is the case in all the species) by a free membrane forming a continuous deeply lobed corona, situated at the base of the corolla, to which it closely adheres. Stigmas filiform.

This plant is not uncommon in England, where it is found to grow upon shrubby plants, such as *Erica*, *Ulex*, *Sarothamnus*, &c.

2. *C. Trifolii* (Bab.); florum glomerulis bracteatis sessilibus, tubo corollæ cylindrico, squamis fimbriatis apice rotundatis lateribus parallelis basi distantibus, calyce tubo corollæ breviori, germine obovato, stigmatibus filiformibus. (Pl. IV. fig. 2.)

*C. Trifolii*, Bab. in *Phytol.* (Feb. 1843), vol. i. p. 467.

*C. Epithymum*,  $\beta$  *Trifolii*, Bab. *Man. Br. Bot.* p. 302.

Flowers rather larger than those of *C. Epithymum*, white. Calyx occasionally tinged with red; sepals ovate-lanceolate, acute, often nearly or quite as long as the tube of the corolla. Limb of the corolla spreading, with very acute attenuated segments. Anthers oblong, apiculate, the lobes rather deeply separated below. Scales nearly as long as the tube of the corolla, of equal width throughout, blunt and rounded at the end, separated by rounded spaces. Germen narrowed below. Stigmas filiform.

In general appearance this plant closely resembles *C. Epithymum*, but is parasitical upon herbaceous *Leguminosæ*. Of late years it has occurred so frequently upon clover (*Trifolium pratense*) in the counties of Norfolk, Suffolk and Essex, as to have destroyed a considerable part of the crop. In Loudon's 'Gardener's Magazine' (vol. iii. p. 208) it is stated that the seeds of *C. europæa* are not unfrequent amongst Dutch clover-seed, and that "the plant is a great nuisance in Holland and Flanders." As a considerable quantity of the clover-seed sown in England is imported from those countries, and as I have never heard of *C. europæa* occurring upon clover, I am led to suspect that the plant

which is so frequent in that position in Holland is the *C. Trifolii*, but not having been able to obtain either specimens or good descriptions of the Dutch plant, I am unable to determine with certainty. My friend Mr. G. S. Gibson of Saffron Walden informs me, that one of the crops of clover in which the Dodder was found was also infested with large quantities of *Barkhausia setosa*, which is a native of the European continent, and was undoubtedly introduced with the clover-seed. *Centaurea solstitialis* occurred in a similar manner in another field. Bertoloni states (Fl. Ital. vol. iii. p. 69) that his *C. europæa* "pestis pratorum est, in quibus serunt *Trifolia*, aut *Medicaginem sativam*;" but as he describes the plant as not possessing any scales beneath the stamens, I am in doubt to what species his description refers. Dr. Lindley considers our plant to be the *C. sulcata* (Roxb.), of which specimens are preserved in the great Indian herbarium formed by Dr. Wallich, and presented to the Linnæan Society by the Hon. East India Company (no. 1320); they have capitate stigmas, and are therefore a different species, neither do they grow upon Leguminous plants. After a careful examination of the published characters of the species of *Cuscuta*, I have been led to the conclusion that this plant, and also the following, are still undescribed, and have therefore ventured to publish them as new.

3. *C. approximata* (nova species); florum glomerulis bracteatis sessilibus, tubo corollæ ventricosus vix calyce longiore, squamis approximatis bifidis: lobis divergentibus latis apice fimbriatis truncatis, germine ovali, stigmatibus filiformibus. (Pl. IV. fig. 3.)

Flowers small, whitish, slightly stalked. Sepals rhomboidal-ovate, acute, about as long as the tube of the corolla. Segments of the corolla spreading (?), blunt. Anthers cordate. Scales shorter than the tube of the corolla, widest at the base, deeply bifid; the lobes truncate, fringed at the end, widely separated at the top, but closely approximating to those of the adjoining scales, from which they are divided by a narrow space which terminates below in a very acute angle. It would perhaps be more correct to describe these parts, not as five scales, but as a continuous corona, deeply divided into ten truncate lobes, which are disposed in pairs alternating with the stamens. Germen oval, narrowed above and below, as far as I can judge from the examination of soaked specimens, not having seen it when fresh. Stigmas filiform.

This plant was found upon *Melilotus sativa*, which had been raised from seed distributed by Col. Sykes, Director of the Hon. East India Company, under the name of Bokhara Clover. I am indebted to my friend the Rev. W. S. Hore of Devonport for the specimens examined.

Having been unable to find a trace of this plant in books, it

is now named and described as new, the name being derived from the peculiar form of its corona, concerning which I have already spoken at some length. In general appearance it closely resembles *C. Trifolii* and *C. Epithymum*.

4. *C. europæa* (Linn.); florum glomerulis bracteatis sessilibus, tubo corollæ per anthesin cylindrico, fructiferæ ventricoso, *squamis adpressis erectis bifidis basi distantibus*: lobis divergentibus attenuatis, *calyce corolla multo breviori*, stigmatibus filiformibus. Pl. IV. fig. 4. *C. europæa*, Linn. *Sp. Pl.* p. 180. *excl.* var.  $\beta$ .

Scales closely adpressed to the tube of the corolla, always present, narrow, bifid; their lobes slender, very acute, entire, or with two or three obscure teeth at the end; each scale separated from its neighbour by a broad rounded space. Stigmas filiform.

Parasitical upon herbaceous plants, such as *Urtica*, *Humulus*, *Carduus*, &c.

St. John's College, Cambridge, Feb. 1, 1844.

XXXII.—*Catalogue of Irish Entozoa, with observations.* By O'BRYEN BELLINGHAM, M.D., Fellow of and Professor of Botany to the Royal College of Surgeons in Ireland, Member of the Royal Zoological, Geological and Natural History Societies of Dublin, &c.

[Continued from p. 174.]

## Order 2. ACANTHOCEPHALA.

(Derived from ἀκανθα, *spina*, and κεφαλή, *caput*.)

THE order *Acanthocephala* contains only a single genus, *Echinorhynchus*.

The characters of the order are as follows:—

The body is cylindrical or bladder-like, subelastick, obtuse at both extremities, provided with a retractile proboscis, which is armed with minute recurved spines arranged in a regular series. The intestinal canal is complete; the sexes are distinct; females oviparous.

The species are numerous, and occur in all the classes of vertebral animals; they are frequently found attached to the mucous membrane of the alimentary canal by means of their proboscis, consequently their powers of locomotion must be very limited.

## Genus 9. ECHINORHYNCHUS.

(Derived from ἐχῖνος, *echinus*, and ῥύγχος, *proboscis*.)

This is the only genus in the order; it was named by Müller,